Data Structure Recitation

Stack

Qi Feng

Department of Computer Science, Courant Institute of Mathematical Sciences
qf264@nyu.edu

October 5, 2016

Last in First out

Definition

Stack is a structure in which elements are added and removed from only one end; a “last in, first out” (LIFO) stucture.

Collection ADT

Definition

A stack is an example of a collection ADT. Collection ia an object that holds other object. Common operations on collections are inserting removing and iterating through the contents.

Three operations

- push()
- pop()
- top()
- * isEmpty()
- * isFull()

Exceptional Situations

- input value wrong type.
- overflow
- underflow

Array-Based

```
1  public class ArrayStack<T>
2  {
3    protected T[] stack;
4    protected int topIndex = -1;
5
6    public ArrayStack(int maxSize)
7    {
8      stack = (T[]) new Object[maxSize];
9    }
10 }
```

Link-Based

```
1  public class LinkedStack<T>
2  {
3    protected LLNode<T> top;
4
5    public LinkedStack()
6    {
7      top = null;
8    }
9  }
```

Reverse a String

Reverse a string using Stack.
”abcdefg”$\rightarrow$”gfedcba”

Well-Formed Expression

Textbook Section 3.6.

Write a program using Stack to check whether an input string is a well-formed expression.

Postfix Expression

Textbook Section 3.8.

Write a reverse Polish calculator.